

REMARKS

The non-final Office Action was issued on pending claims 1 and 3-11. Claims 3-6 are allowed, claims 1 and 7-11 stand rejected and claim 2 was previously cancelled without prejudice. In this Response, claims 1 and 11 have been amended and no claims have been added or cancelled. Thus, claims 1 and 3-11 are pending in the application.

Applicants kindly request a telephone interview with the Examiner and Applicants' Representative to discuss any issues with this application.

Allowable Claims

In Office Action paragraph 9, claims 3-6 were noted as being allowed. Applicants thank the Examiner for this notice of allowed claims.

Double Patenting

In Office Action paragraph 2, claims 1, 7 and 9-11 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,437,454 B1. Apparently, the reference to 6,347,454 in Office Action paragraph 1 is a typographical error in view of the remarks in Office Action paragraph 11. In Office Action paragraph 3, claims 1 and 9-11 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 6 of U.S. Patent No. 6,436,842 B2. Applicants respectfully disagree.

However, Applicants submit the enclosed terminal disclaimer in view of US 6,437,454 and US 6,436,842 to quickly pass this application to issue. Thus, Applicants submit that the double patenting rejections have been overcome.

Claim Amendments

Claims 1 and 11 have been amended to clarify the claims. Claim 1 pertains to a microdot mark shape which is formed on a surface of an article to be marked. Claim 1 calls for the article to be marked to be a semiconductor wafer. Claim 1 also calls for a microdot mark formed by laser irradiation and comprises a single dot mark on each laser irradiated point. Claim 1 calls for the mark to have a single protrusion, which includes a concave portion provided around the protrusion and lower than a surface of the wafer and whose center portion protrudes upward so as to be higher than the surface of the wafer. Claim 1 further calls for the length of each dot mark along the surface of the article to be marked to be 1.0 to 15.0 μm .

Claim 11 has been similarly amended. Claim 11 also calls for the dot mark to be formed for product management or various securities.

Applicants respectfully submit that clarified claims 1 and 11 are allowable.

Claim Rejections – 35 USC § 102

Claims 1, 7, 8, 10, and 11

In Office Action paragraph 4, claims 1, 7, 8, 10, and 11 were rejected under 35 U.S.C. § 102(e) as being anticipated by O'Dell et al. (US 6,068,891). Applicants respectfully disagree.

In the previous Office Action response dated February 14, 2003, claims 1 and 11 were amended to recite "which is a wafer" in the preambles of the claims. Claims 1 and 11 as clarified in this Response, now recite in the body of the claim that the article to be marked is a semiconductor wafer. Applicants submit that O'Dell et al. does not disclose or suggest that the bumps be applied to a semiconductor wafer as claimed in claims 1 and 11. Applicants kindly refer the Examiner to page 5 of the Office Action response previously submitted on February 14, 2003.

Furthermore, Applicants submit that O'Dell et al. does not disclose or suggest the claimed feature of "the mark has a single protrusion, which includes a concave portion provided

around the protrusion and lower than a surface of the wafer and whose center portion protrudes upward so as to be higher than the surface of the wafer.”. Office Action paragraph 13 refers to Figure 4B of O’Dell et al. as showing a bump having a protrusion at the center and a recessed area surrounding the bump. However, Figure 4B of O’Dell et al. does not show a center protrusion in a dot mark. If the Office Action intended to refer to Figure 4A of O’Dell et al., Figure 4A does not show and O’Dell et al. does not describe a mark having a center portion which protrudes upward so as to be higher than the surface of the wafer.

Even further, O’Dell et al. pertains to a completely different problem than Applicants’ present invention and thus, O’Dell et al. describes laser texturing which is completely different from Applicants’ new dot mark. The dot of the present invention is formed as a mark for obtaining information by reflecting light thereon. Thus, improvement of visibility is a problem addressed by and a purpose of the present invention. To the contrary, O’Dell et al. describes a convex dot made by texturing. The convex dot is made for changing friction on a surface of the dot, and that is the problem addressed by and the purpose of O’Dell et al. That is, the dot of O’Dell et al. is not made for being read as a mark. O’Dell et al. does not describe an intention to read the dot mark, and of course, there is no such statement of dot mark reading in O’Dell et al. Further, the dot of O’Dell et al. is an aggregate of many needlelike projections rather than Applicants’ single center protrusion. Accordingly, it doesn’t appear that the dot of O’Dell et al. can be read as a single mark like the dot of the present invention. Because O’Dell et al. relates to a laser texturing art, O’Dell et al. can not achieve a solution to the problem of improvement of visibility while capable of being recognized as a mark, which has been solved by the present invention.

Thus, Applicants respectfully submit that the section 102(e) rejection based on O’Dell et al. has been overcome.

Claims 1 and 8-11

In Office Action paragraph 5, claims 1 and 8-11 were rejected under 35 U.S.C. § 102(e) as being anticipated by Matsumura et al. (US 6,248,973). Applicants respectfully disagree.

Matsumura et al. is assigned to the same assignee (KOMATSU LIMITED) as the present application. Although Matsumura et al. pertains to a laser marking method for semiconductor wafer, the present invention is quite different from Matsumura et al. Amended claim 1 now recites "the mark has a single protrusion, which includes a concave portion provided around the protrusion and lower than a surface of the wafer and whose center portion protrudes upward so as to be higher than the surface of the wafer." A difference of the dot mark shape between the present application and Matsumura et al. should be clearer.

According to amended claim 1, the difference between the present invention and Fig. 3C of Matsumura et al., which was referred to by the Examiner, is clear. In Matsumura et al., Fig. 3C shows several protrusions having the same height, so that the protrusions are not composed of a single protrusion, which has a concave portion provided around the protrusion and lower than a surface of the wafer and whose center portion protrudes upward so as to be higher than the surface of the wafer. The structural differences of the dots in the present invention and Matsumura et al. provide different effects. According to the dot of Matsumura et al., a plurality of reflections occur when irradiating light on the multiple protrusions of each dot. Conversely, there is only one reflection per one protrusion of each dot in the present invention, and the visibility as one dot is improved.

Thus, Applicants submit that the § 102(e) rejections based on Matsumura et al. have been overcome.

Claim Rejections – 35 USC § 103

Claims 1 and 8-11

In Office Action paragraph 7, claims 1 and 8-11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kruger (US 4,847,183). Applicants respectfully disagree.

Kruger describes a dot mark made by mesa etching of a semiconductor element. The Office Action asserts that the dot mark of Kruger has the same dimension as that of the dot mark of the present application. However, Applicants' dot mark is structurally different from the

Kruger dot mark. In Kruger, a new wafer surface is made by cutting (etching) the unnecessary part of the wafer surface. Consequently, the dot in Kruger is different from the dot of the present application which is protruded from the original surface of the wafer. Further, the structure of the dot of the present application has a single dot mark on each laser irradiated point. Kruger does not disclose or suggest a laser irradiated point or a protrusion at such a point.

Thus, Applicants submit that the § 103(a) rejections in view of Kruger have been overcome.

Claims 1 and 7-11

In Office Action paragraph 8, claims 1 and 7-11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ota et al. (US 5,477,309). Applicants respectfully disagree.

Ota et al. pertains to an alignment apparatus of semiconductor elements. The Office Action asserts that the dot mark of Ota et al. has the same dimension as that of the dot mark of the present application. However, Applicants' dot mark is structurally different from the Ota et al. mark. In Ota et al. the mark is formed by etching and/or sputtering and is different in its shape from the dot of the present application, which is formed by laser irradiation and consists of a single dot mark on each laser irradiated point. That is, Ota et al. does not disclose the dot of the present application which is protruded from the original surface of wafer. Further, the dot of the present application is made by laser irradiation on a laser irradiated point. Ota et al. does not disclose or suggest a laser irradiated point or a protrusion at such a point.

Thus, Applicants submit that the § 103(a) rejections based on Ota et al. have been overcome.

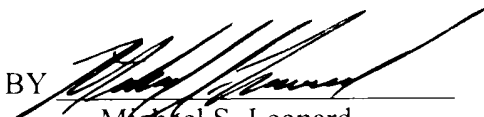
CONCLUSION

For the foregoing reasons, Applicants submit that the patent application is in condition for allowance and request a Notice of Allowance be issued.

Respectfully submitted,

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